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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/588,755 | BEN-DAVID ET AL. | |
| | Examiner | Art Unit | |
| | ILANA SPAR | 2629 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *30 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,5-18,21-32,36 and 38-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-18,21,32,36 and 38-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. The following Office Action is responsive to the amendments and remarks received on July 30, 2009.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 5, 10, 11, 13-15, 17, 18, 21, 26-32, 36, and 38-40 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuriwaki et al. (European Patent Publication No. 0,831,451).

With reference to claim 1, Kuriwaki et al. teaches a color display device for displaying a more-than-three color image, the device comprising a driver control module (1) to controllably activate one or more drivers of an array of sub-pixel elements of at least four different colors (R,B,YG,BG) based on image data representing pixels of said color image in terms of at least three data components (RGB) (see page 4, lines 3-11) wherein said driver control module comprises:

a conversion module (2) for converting said image data into converted sub-pixel data representing said color image in terms of four or more primary colors (see page 4, lines 8-11) said conversion module comprises:

a first converter (21) for converting said image data into intermediate sub-pixel data of four or more primary colors (see page 4, lines 8-11), and

a second converter (31-34) for converting said intermediate sub-pixel data into said converted sub-pixel data, based on at least one display attribute related to said display device and image attributes related to said color image (see page 4, lines 18-19), and

a controller (11) to control said conversion module to convert said image data based on said one or more display-attributes and said one or more image attributes (see page 4, lines 3-11).

With reference to claim 5, Kuriwaki et al. teaches all that is required with reference to claim 1, and further teaches that the second converter is able to convert said intermediate sub-pixel data using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see page 7, line 5 to page 8, line 55).

With reference to claim 10, Kuriwaki et al. teaches all that is required with reference to claim 1, and further teaches that said driver control module comprises a sub-pixel processor (3) to process said converted sub-pixel data, wherein said controller is able to control said processor to generate a sub-pixel signal based on at least one of said image attributes and said display characteristics (see page 4, lines 15-19).

With reference to claim 11, Kuriwaki et al. teaches all that is required with reference to claim 10, and further teaches an interface module (35, 36, 37, 38) to

generate said driver signals based on said sub-pixel data signal (see page 4, lines 15-22).

With reference to claim 13, Kuriwaki et al. teaches all that is required with reference to claim 1, and further teaches that the said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of said sub-pixel elements within said array, a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see page 3, line 56 to page 4, line 1 - the attribute being the configuration of sub-pixel elements).

With reference to claim 14, Kuriwaki et al. teaches all that is required with reference to claim 1, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see page 4, lines 25-28 – the attribute being a color uniformity/rendering scheme).

With reference to claim 15, Kuriwaki et al. teaches all that is required with reference to claim 1, and further teaches a display panel containing said driver control module and said array of sub-pixel elements (see page 3, line 48).

With reference to claim 17, Kuriwaki et al. teaches a method of displaying a more-than-three color image comprising controllably activating one or more drivers of

an array of sub-pixel elements of at least four different colors, based on image data representing pixels of said color image in terms of at least three data components (see page 4, lines 3-11), said one or more drivers to perform:

converting said image data into intermediate sub-pixel data of four or more primary colors (see page 4, lines 8-11); and

converting said intermediate sub-pixel data into a converted sub-pixel data, based on at least one of: a display attribute related to said display device and an image attribute related to said color image, to produce converted sub-pixel data representing said color image in terms of four or more primary colors (see page 4, lines 18-19).

With reference to claim 18, Kuriwaki et al. teaches all that is required with reference to claim 17, and further teaches generating one or more driver signals for activating said drivers based on one or more display attributes related to said display device and one or more image attributes related to said color image (see page 4, lines 3-11).

With reference to claim 21, Kuriwaki et al. teaches all that is required with reference to claim 17, and further teaches that converting said intermediate sub-pixel data comprises converting said intermediate sub-pixel data using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see page 7, line 5 to page 8, line 55).

With reference to claim 26, Kuriwaki et al. teaches all that is required with reference to claim 17, and further teaches processing said converted sub-pixel data and

generating a sub-pixel signal based on at least one of said image attributes and said display attributes (see page 4, lines 15-19.

With reference to claim 27, Kuriwaki et al. teaches all that is required with reference to claim 26, and further teaches generating said driver signals based on said sub-pixel data signal (see page 4, lines 15-22).

With reference to claim 28, Kuriwaki et al. teaches all that is required with reference to claim 18, and further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of said sub-pixel elements within said array, a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see page 3, line 56 to page 4, line 1 - the attribute being the configuration of sub-pixel elements).

With reference to claim 29, Kuriwaki et al. teaches all that is required with reference to claim 18, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see page 4, lines 25-28 – the attribute being a color uniformity/rendering scheme).

With reference to claim 30, Kuriwaki et al. teaches a color display system for displaying a more-than-three color image, the system comprising:

an input interface (1) to generate image data signals representing pixels of said color image in terms of at least three data components (see page 4, lines 3-11); and

a driver control module (11) to controllably activate one or more drivers of an array of sub-pixel elements of at least four different colors, based on said image data signals (see page 4, lines 3-11).

With reference to claim 31, Kuriwaki et al. teaches all that is required with reference to claim 30, and further teaches that said driver control module is able to generate one or more driver signals for activating said drivers based on one or more display attributes related to said image display device and one or more image attributes related to said color image (see page 4, lines 3-11).

With reference to claim 32, Kuriwaki et al. teaches all that is required with reference to claim 31, and further teaches that said driver control module comprises:

a conversion module (2) to convert said image data signals into converted sub-pixel data signals representing said color image in terms of four or more colors (see page 4, lines 8-11); and

a controller (11) to control said conversion module to convert said image data signals based on said one or more display-attributes and said one or more image-attributes (see page 4, lines 3-11).

With reference to claim 36, Kuriwaki et al. teaches all that is required with reference to claim 32, and further teaches that said driver control module comprises a sub-pixel processor (3) to process said converted sub-pixel data signals, wherein said

controller is able to control said processor to generate a sub-pixel signal based on at least one of said image attributes and said display attributes (see page 4, lines 15-19).

With reference to claim 38, Kuriwaki et al. teaches all that is required with reference to claim 30, and further teaches that the said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of said sub-pixel elements within said array, a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see page 3, line 56 to page 4, line 1 - the attribute being the configuration of sub-pixel elements).

With reference to claim 39, Kuriwaki et al. teaches all that is required with reference to claim 30, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see page 4, lines 25-28 – the attribute being a color uniformity/rendering scheme).

With reference to claim 40, Kuriwaki et al. teaches all that is required with reference to claim 30, and further teaches a display panel containing said driver control module and said array of sub-pixel elements (see page 3, line 48).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 6-8, 12, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriwaki et al. in view of Kumada et al. (US Patent No. 5,563,725).

With reference to claim 6, Kuriwaki et al. teaches all that is required with reference to claim 1, but fails to teach combining first and second intermediate pixels.

Kumada et al. teaches a conversion module comprising:

a first converter (52) to convert the image data representing pixels of said color image in terms of at least three data components into first intermediate sub-pixel data of said four or more colors (see Figure 2 and column 1, lines 49-52);

a second converter (54) to convert the image data representing pixels of said color image in terms of at least three data components into second intermediate sub-pixel data of three or more colors (see Figure 2, and column 1, lines 49-52); and

a combiner (56) to combine said first and second intermediate sub-pixel data into said converted sub-pixel data (see Figure 2 and column 1, lines 52-56),

wherein said controller is able to control at least one of said first and second converters and said combiner based on at least one of said display attributes and image attributes (see column 1, lines 42-56).

It would have been obvious to one of ordinary skill in the art at the time of invention to use two converting circuits to convert the RGB data to four-color data such that each converter is designed to carry out a specific task; in this case, one converter is used to modify the data format, while the other is then able to match the format of the data with the properties which the data would need to possess in order to be properly displayed. This simplifies the construction of the converters and can increase processing speed.

With reference to claim 7, Kuriwaki et al. and Kumada et al. teach all that is required with reference to claim 6, and Kumada et al. further teaches that said second converter is able to convert the image data representing pixels of said color image in terms of at least three data components using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see column 8, lines 9-12).

With reference to claim 8, Kuriwaki et al. teaches all that is required with reference to claim 5, but fails to teach determining the values of the conversion matrix.

Kumada et al. teaches that said controller is able to determine one or more values of said conversion matrix based on a combination of said one or more display-

attributes and said one or more image-attributes (see column 8, lines 9-12 and column 2, lines 52-55).

It would have been obvious to one of ordinary skill in the art at the time of invention that when altering display data it is necessary to take into account the display on which the image is being displayed, such that the altered data is compatible with the display, and also the desired quality of image, such that the data can be altered to match that quality.

With reference to claim 12, Kuriwaki et al. teaches all that is required with reference to claim 1, but fails to teach a memory.

Kumada et al. teaches a memory to store display-related data representing said one or more display attributes (see column 6, lines 35-39).

It would have been obvious to one of ordinary skill in the art at the time of invention to store display attributes in a memory such that they can easily and repeatedly be accessed as necessary to convert the incoming data.

With reference to claim 22, Kuriwaki et al. teaches all that is required with reference to claim 17, but fails to teach combining first and second intermediate pixels.

Kumada et al. teaches that converting said image data comprises:

converting the image data representing pixels of said color image in terms of at least three data components into first intermediate sub-pixel data of said at least four primary colors (see Figure 2 and column 1, lines 46-49);

converting the image data representing pixels of said color image in terms of at least three data components into second intermediate sub-pixel data of at least three primary colors (see Figure 2 and column 1, lines 49-52);

combining said first and second intermediate sub-pixel data into said converted sub-pixel data (see Figure 2 and column 1, lines 52-56); and

controlling at least one of converting said image data into said first intermediate sub-pixel data, converting said image data into said second intermediate sub-pixel data, and said combining, based on at least one of said display attributes and said image attributes (see column 1, lines 42-56).

It would have been obvious to one of ordinary skill in the art at the time of invention to carry out two conversions to convert the RGB data to four-color data such that each converter is designed to carry out a specific task; in this case, one converter is used to modify the data format, while the other is then able to match the format of the data with the properties which the data would need to possess in order to be properly displayed. This simplifies the construction of the converters and can increase processing speed.

With reference to claim 23, Kuriwaki et al. and Kumada et al. teach all that is required with reference to claim 22, and Kumada et al. further teaches that converting said image data into said second intermediate sub-pixel data comprises converting said image data using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see column 8, lines 9-12).

With reference to claim 24, Kuriwaki et al. teaches all that is required with reference to claim 21, but fails to teach determining the values of the conversion matrix.

reference to claim 5, but fails to teach determining the values of the conversion matrix.

Kumada et al. teaches determining one or more values of said conversion matrix based on a combination of said one or more display-attributes and said one or more image-attributes (see column 8, lines 9-12 and column 2, lines 52-55).

It would have been obvious to one of ordinary skill in the art at the time of invention that when altering display data it is necessary to take into account the display on which the image is being displayed, such that the altered data is compatible with the display, and also the desired quality of image, such that the data can be altered to match that quality.

7. Claims 9 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriwaki et al. in view of Inoue (US Patent No. 5,896,178).

With reference to claim 9, Kuriwaki et al. teaches all that is required with reference to claim 5, but fails to teach that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data.

Inoue teaches that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data (see column 8, lines 21-24).

It would have been obvious to one of ordinary skill in the art at the time of invention to base the conversion factors on the timing of the display signal such that the modified data is still displayed for the intended amount of time. The need for this becomes even further obvious when the display signal is a dynamic video signal.

With reference to claim 25, Kuriwaki et al. teaches all that is required with reference to claim 21, but fails to teach determining one or more values of said conversion matrix based on one or more timing signals related to said image data.

Inoue teaches that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data (see column 8, lines 21-24).

It would have been obvious to one of ordinary skill in the art at the time of invention to base the conversion factors on the timing of the display signal such that the modified data is still displayed for the intended amount of time. The need for this becomes even further obvious when the display signal is a dynamic video signal.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriwaki et al. in view of Hirano et al. (International Publication No. WO 01/37249).

Kuriwaki et al. teaches all that is required with reference to claim 1, but fails to teach an array of liquid crystals.

Hirano et al. teaches a display that converts three color data to a four color display, and teaches that the display is a liquid crystal display panel (see page 1, lines 1-12).

It would have been obvious to one of ordinary skill in the art at the time of invention that data conversion can be carried out on any type of display, and that a liquid crystal display is capable of having pixels of more than three colors, such that the method described by Kuriwaki et al. for an LED display could also be carried out by an LCD display.

***Response to Arguments***

9. Applicant's arguments with respect to claims 1-40 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ILANA SPAR whose telephone number is (571)270-7537. The examiner can normally be reached on Monday-Thursday 8:00-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (571)272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ILS

/Amare Mengistu/
Supervisory Patent Examiner, Art Unit 2629